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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,038	03/27/2006	Kenji Hosaka	NNA-246-B	8023

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YOUNG BASILE
3001 WEST BIG BEAVER ROAD
SUITE 624
TROY, MI 48084

EXAMINER

ENIN-OKUT, EDU E

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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09/16/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/574,038	Applicant(s) HOSAKA ET AL.	
	Examiner Edu E. Enin-Okut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 5-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

BIPOLAR ELECTRODE BATTERIES
AND METHODS OF MANUFACTURING BIPOLAR ELECTRODE BATTERIES

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 3, 2009 has been entered. Applicant has amended claims 1, 3, 10 and 12; and, cancelled claim 4. Currently, claims 1, 3 and 5-21 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 12-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 12 recites "... applying a first layer of liquid electrolyte ...", and "... applying a second layer of liquid electrolyte ...". The methods of preparation described in applicant's instant specification

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discuss either a gel electrolyte or a solid electrolyte. The application of a "liquid" electrolyte in the manner recited in the claim is not described in the specification.

Claim Rejections - 35 USC § 102

5. The rejection of claims 1, 3, 5, 6, 8 and 10-11 under 35 U.S.C. 102(b) as being anticipated by Munshi (US 6,664,006) is maintained. (The rejection of claim 4 under 35 U.S.C. 102(b) as being anticipated by Munshi (US 6,664,006) is withdrawn because claim 4 was cancelled.)

Regarding claims 1 and 3-6, Munshi teaches stackable solid-state electrochemical cells, such as ultra-thin bipolar batteries with bipolar electrode structures having a polymer substrate serving as the film bipolar element (bipolar electrode stack) (9:36-40, 26:4-7, 29:1-7, 29:20-22). The bipolar structure is made by laminating anode and cathode active elements to opposing sides of a polymer substrate (collector) impregnated with conductive materials, such as a carbon black or metallic elements, dispersed throughout the polymer material of the substrate (26:7-18). Munshi also teaches that the impregnated substrate, highly desirable for bipolar designs, can be metallized; however, metallization of the substrate is optional (22:49-50, 22:52-53). The polymer material forming the polymer substrate described above includes polyester (PET) (high-polymer material) and may also be impregnated with an electronically conductive element including electronically conducting polymers, such as polyacetylene, polypyrrole, polyaniline, etc. (21:66-22:8, 22:18-27, 22:28-43, 22:49-50, 26:11-14). (One would appreciate that "PET" is the acronym for polyethylene terephthalate.)

As to the electrolyte being a liquid, although applicant states that "The electrolyte layer can be a liquid, a gel and/or a solid phase. ..." in Paragraph 44 of its specification, it goes on to state "... Considering safety factors and the prevention of liquid leakage if the battery is broken, the electrolyte layer is preferably a gel polymer electrolyte layer or an all-solid electrolyte layer. By using the gel polymer electrolyte layer as the electrolyte, the fluidity of the electrolyte is eliminated, the leakage of the

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electrolyte into the collector is prevented and the ion conductivity among each layer can be blocked. ...” in that paragraph. Similarly, Munshi states that “... liquid solvent electrolyte in any of the above cell systems [rechargeable lithium battery systems] is often corrosive and toxic and presents handling difficulties through spillage or leakage from the cell. ...” (2:48-51). Therefore, one of ordinary skill in the art would readily appreciate that, despite the drawbacks as expressed by applicant's specification and Munshi, a liquid electrolyte can be used in the battery of Munshi described above.

Regarding claim 8, Munshi also discloses that opposite ends an electrochemical cell can have a layer of metal sprayed onto them to serve as battery terminations (electrode extracting plates) (25:46-49).

Regarding claims 10 and 11, Munshi discloses that the batteries can be stacked in rectangular prismatic modules [battery module] and may be used as a cost-effective power source for an electric vehicle (6:33-44, 29:30-34). The remaining limitations recited in claim 10 have been addressed above with respect to claim 1.

Claim Rejections - 35 USC § 103

6. The rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable over Munshi as applied to claims 1, 3, 5, 6, 8, 10 and 11, and further in view of Hwang et al. (US 2005/0084760) is maintained.

Munshi is applied and incorporated herein for the reasons above.

Regarding claim 7, Munshi does not expressly teach that the high-polymer material exhibits a weight average molecular weight of from about 50,000 Daltons to about 1 million Daltons.

Hwang teaches a battery that includes a current collector having a polymer film with a metal deposited on the polymer film (Abstract; para. 12). The polymer film has a rigid characteristic which keeps it from stretching during the rolling step of the battery fabrication process while still having sufficient flexibility to be rolled during the fabrication process (para. 13). The polymer may be a polyethylene terephthalate, polyimide, polytetrafluoroethylene, polyethylene naphthalene, polyvinylidene

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fluoride, polyethylene naphtha late, polypropylene, polyethylene, polyester, or polysulfone (para. 13). The polymer has a molecular weight of 10,000 to 7,000,000, and preferably 50,000 to 5,000,000 (para. 13).

Since it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)), it would have been obvious to one of ordinary skill in the art at the time of the invention to form the collector of Munshi using a polymer with a weight as recited by the claim because Hwang teaches that polymers with weight within that range produce a strong, but flexible, film. See MPEP 2144.05 (I).

7. The rejection of claim 9 under 35 U.S.C. 103(a) as being unpatentable over Munshi as applied to claims 1, 3, 5-8, 10 and 11 above, and further in view of Usui et al. (US 6,656,232) is maintained.

Munshi is applied and incorporated herein for the reasons above.

Regarding claim 9, Munshi teaches that opposite ends of its electrochemical cells have a layer of metal sprayed onto them to serve as battery terminations, as discussed above.

Munshi does not expressly teach that the sprayed metal forms a metal foil.

Usui teaches a method of manufacturing of a battery electrode (Title). The reference discusses that producing an electrode including a metal sprayed layer on one side of the electrode on which to weld the lead piece, a method of depositing metal foil in advance for reinforcement, etc., to improve the electric conductivity of a material core portion (1:41-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the electrode extracting plate of Munshi by depositing a metal foil because Usui teaches that it is a method with which to produce an electrical contact within a battery.

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8. Claims 1, 3, 5, 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. (JP 2004-179053 A; refer to Abstract and machine translation) in view of Hinton et al. (US 6,103,413).

Regarding claims 1, 3 and 5, Fukuzawa teaches a bipolar battery laminating bipolar electrodes (bipolar electrode stack) in which a positive active material layer 3 (cathode) is formed on one side of a current collector 2 and a negative active material layer 4 (anode) on the other side on both sides of a gel electrolyte layer 5 (Abstract; Drawing 1). The current collector is composed of a metal powder and resin binder (machine translation, para. 36). The resin binder may be, for example, an epoxy or a conductive polymer (para. 37). Upon operation, even though the gel electrolyte may liquefy (i.e., when the electrolytic solution contained in the gel is at 70 wt % or more), the construction of the battery prevents leakage of the electrolyte (para. 32).

Fukuzawa does not expressly teach that the collector includes a high-polymer material which itself includes one or more of a polyethylene terephthalate, a polyimide or a polyamide.

Hinton teaches a bipolar separator plate for electrochemical cells composed of suitable polymeric materials (e.g., polyethylene terephthalate, polyamides and polyimides) containing a conductive filler (e.g., carbon black, graphite, metal particles, and intrinsically conductive polymer particles) (Title; 2:11-41).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a high-polymer material, containing conductive carbon particles or an electrically conductive polymer, in the collector used in the battery of Fukuzawa because Hinton teaches their use produces a conductive plate with characteristics suitable for use in electrochemical cells (see Hinton, Abstract; 1:56-63).

Regarding claim 8, Fukuzawa teaches positive and negative electrode terminal boards, composed of materials such as aluminum, copper, titanium, nickel, stainless steel (SUS) and alloys thereof, in contact with the external surface of the charge collector (machine translation, para. 59-62).

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Regarding claims 10 and 11, Fukuzawa teaches that a group of two more batteries (a battery module) may be used in a vehicle as a power supply (machine translation, para. 85, 91; Drawings 10, 11, 12). The remaining limitations recited in these claims have been addressed above with respect claims 1 and 3.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. and Hinton et al. as applied to claims 1, 3, 5, 8, 10 and 11 above, and further in view of Munshi.

Fukuzawa and Hinton are applied and incorporated herein for the reasons above.

Regarding claim 6, Fukuzawa and Hinton do not expressly teach one or more of the electrically conductive polymer recited in the claim.

Munshi teaches bipolar batteries with a polymer substrate (serving as a collector) impregnated with conductive materials where the electronically conductive element including electronically conducting polymers, such as polyacetylene, polypyrrole, polyaniline, etc., as discussed above. Thus, it would have been obvious to include one or more electrically conductive polymer in the collector of Fukuzawa, as modified by Hinton, in the manner described by Munshi because Munshi teaches that its inclusion lends electrical conductivity to the collector.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. and Hinton et al. as applied to claims 1, 3, 5, 6, 8 and 10-11, and further in view of Hwang et al. (US 2005/0084760) is maintained.

Fukuzawa and Hinton are applied and incorporated herein for the reasons above.

Regarding claim 7, Fukuzawa and Hinton do not expressly teach that the high-polymer material exhibits a weight average molecular weight of from about 50,000 Daltons to about 1 million Daltons.

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Hwang teaches a battery that includes a current collector having a polymer film with a metal deposited on the polymer film with characteristics, such being flexible while maintaining an amount rigidity, useful in the battery fabrication process (Abstract; para. 12, 13). The polymer may be a polyethylene terephthalate, polyimide, polytetrafluoroethylene, polyethylene naphthalene, polyvinylidene fluoride, polyethylene naphthalate, polypropylene, polyethylene, polyester, or polysulfone, with a molecular weight of 10,000 to 7,000,000, and preferably 50,000 to 5,000,000 (para. 13).

Since it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)), it would have been obvious to one of ordinary skill in the art at the time of the invention to form the collector of Fukuzawa, as modified by Hinton, using a polymer with a weight as recited by the claim because Hwang teaches that polymers with weight within that range produce a strong, but flexible, film. See MPEP 2144.05 (I).

11. The rejection of claim 9 under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. and Hinton et al. as applied to 1, 3, 5-8, 10 and 11 claims above, and further in view of Usui et al.

Fukuzawa and Hinton are applied and incorporated herein for the reasons above.

Regarding claim 9, Fukuzawa teaches metallic positive and negative electrode terminal boards as described above. However, Fukuzawa and Hinton do not expressly teach that the electrode extracting plate is a metal foil.

Usui teaches a method of manufacturing of a battery electrode including producing an electrode using a metal sprayed layer on one side of the electrode on which to weld the lead piece, a method of depositing metal foil in advance for reinforcement, etc., to improve the electric conductivity of a material core portion (1:41-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the electrode extracting plate used in the battery of Fukuzawa, as modified by Hinton,

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by depositing a metal foil because Usui teaches that it is a method with which to produce an electrical contact within a battery.

Double Patenting

12. The rejection of claims 1 and 8-11 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 16-17 and 19-21 of copending Application No. 11/946,177 in view of Munshi (US 6,664,006) is withdrawn because claims 1 and 10 were amended.

Response to Arguments

13. Applicant's arguments filed August 3, 2009 have been fully considered but they are not persuasive.

14. Applicant makes the following arguments in its remarks:

(a) "Munshi does not teach a collector comprised of a high-polymer material of one or more of polyethylene terephthalate, polyimide, and polyamide." (see p. 6-7)

(b) "Munshi also does not disclose one or more layers of liquid electrolyte." (see p. 7)

15. As to applicant's arguments (a) above, Munshi does teach a collector formed of a polymer substrate made of a high-polymer material, i.e., a polyethylene terephthalate (PET), as discussed in the previous Office Action and reproduced in the rejection of the amended claim 1 in Paragraph 5 above.

16. As to applicant's argument (b) above, it should be noted that "[t]he use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983). See MPEP 2123 (I). Further, applicant is

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directed to the discussion of the “liquid electrolyte” in the rejection of the amended claim 1 presented in Paragraph 5 above.

17. As to the remainder of applicant’s arguments, they have been considered but applicant has amended the claims such that new grounds of rejection were necessitated.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST). (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E Enin-Okut/
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/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795